

# Los Alamos Fusion Energy Program

Richard E. Siemon

Program Manager

Fusion Energy Sciences Office

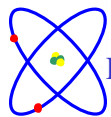
Los Alamos National Laboratory

April 5, 2000

Field Work Proposal Presentations

DOE Office of Fusion Energy Sciences

Germantown, MD

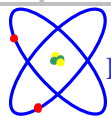


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## LANL Budget Request Summary

				FY 00		FY01 PM	FY01 RR		FY02 PM	FY02 RR
Off-site Collaborations										
	Advanced Fusion Diagnostics			220		220	220		220	220
	NSTX, Princeton			250		250	280		250	300
	Rotomak, U. Wash.			246		246	220		246	220
	SSPX Spheromak, LLNL			120		129	205		129	270
	C-Mod, MIT			95		95	105		95	240
Innovative Confinement Concepts										
	Penning Fusion Experiment			557		425	557		425	573
	Magnetized Target Fusion			1506		1506	2500		1506	2500
Theory										
	Toroidal Theory			915		920	920		920	920
	Alternate Concepts			145		150	150		150	150
Fusion Technology										
	Beryllium			30		30	30		30	30
	IFE Target Fabrication			425		425	425		425	425
	TSTA deactivation			2000		2000	3600		2000	3600
	TOTALS			6509		6396	9212		6396	9448

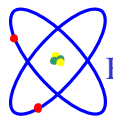


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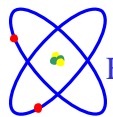
# LANL off-site collaborations

- Rotamak current drive...** Installed in Nov. 1999 at Seattle on the TCS Field Reversed Configuration, and now operating at the 100 MW level. (1 postdoc) (Ron Blanken)
- Alcator C-Mod...** Digital infrared imaging is providing first views of the high heat (both inside and outside) flux divertor strike points. Fast visible imaging measurements of turbulent filaments is ongoing. (Rostam Dagazian)
- NSTX...** LANL fast visible camera system was critical diagnostic during the first year of NSTX operation. Imaging of fast fluctuations, aided by localized gas puffing was tested, and will provide a wealth of information on the structures of edge turbulence. Capital funds are needed for a new & improved camera system. (Don Priester)
- LHD...** the prototype infrared imaging bolometer is installed on LHD, and first calibrations and plasma data have been obtained. Difficulty with magnetic field interference on a Japanese component has slowed the pace this year, but it will be solved for the upcoming run period. (Darlene Markevich)
- SSPX...** LANL laser interferometry at LLNL is providing important density information as the SSPX team explores the spheromak operating space. (1 postdoc) (Ron Blanken)



# Penning Fusion Experiment

- **Have demonstrated confinement of non-thermal beam-generated electron plasma (nonneutral)**
- **PFX-I will study ion physics in uniform density electron cloud including new oscillating-potential mode**
- **Scaling path is to higher voltages, small size**
- **Massively modular reactor concept avoids material problems, removes insulators from high neutron flux, provides heating power from direct conversion**



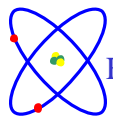
# Magnetized Target Fusion (MTF)

## The FY2000 MTF Team exploring FRC formation

Los Alamos National Laboratory  
Air Force Research Laboratory  
Lawrence Livermore National Laboratory  
General Atomics

Revised request would include:

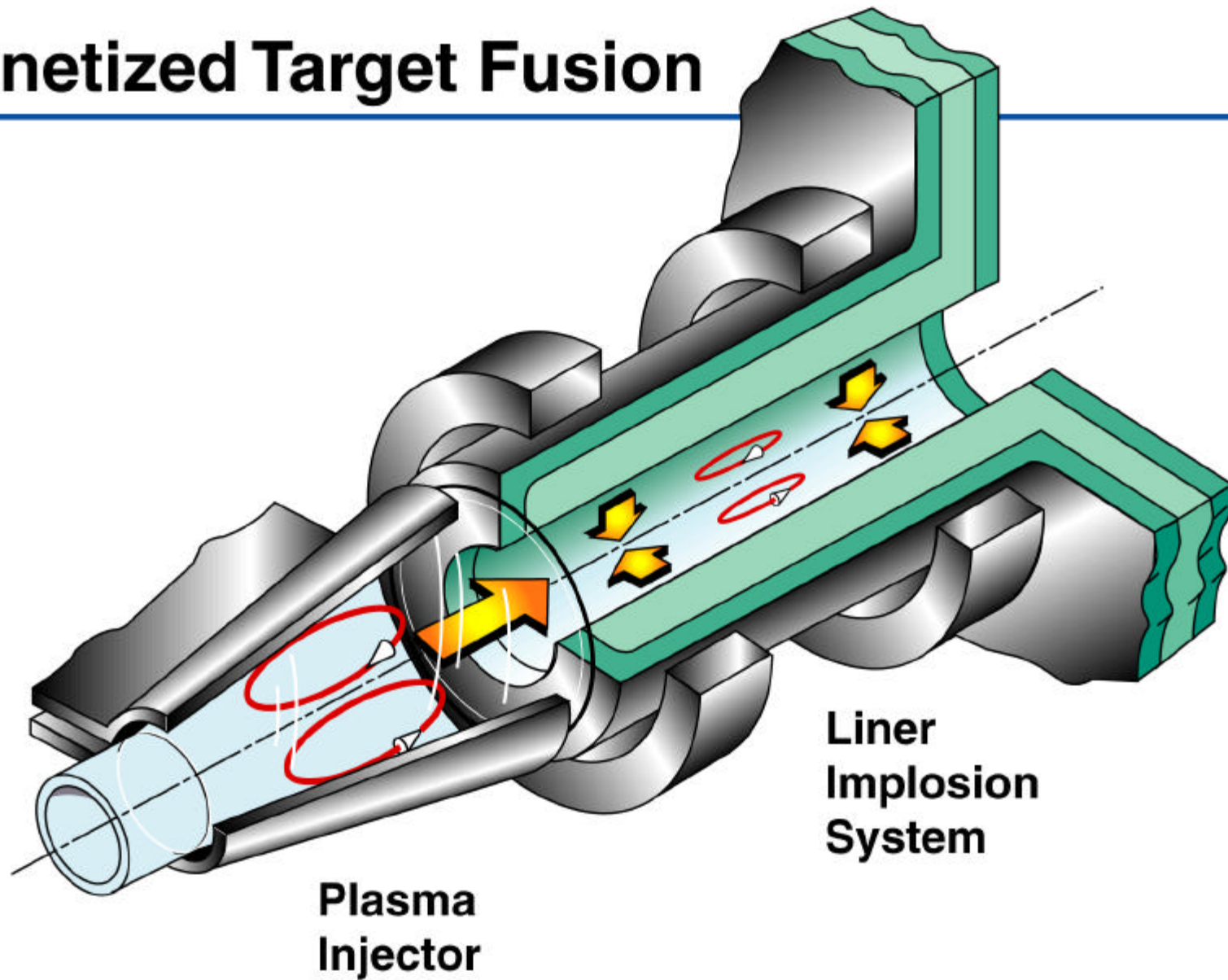
MIT  
PPPL  
University of Washington  
University of California, Berkeley  
University of California, San Diego  
University of Wisconsin



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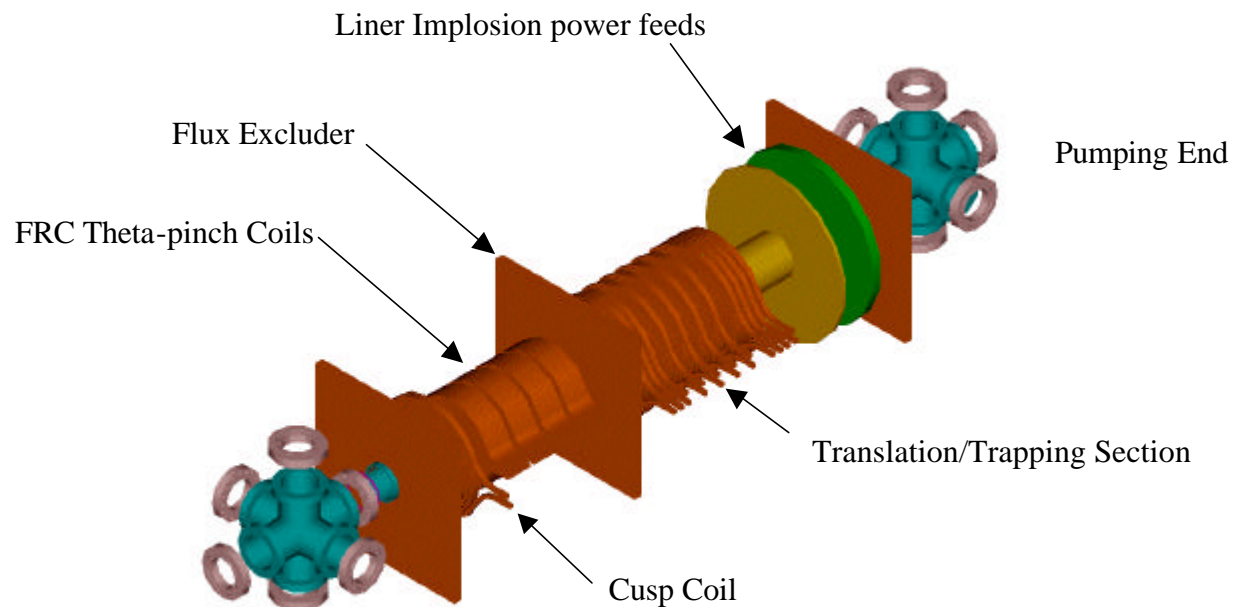
# Magnetized Target Fusion

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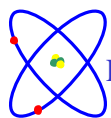
# MTF Plasma Injector Design

- Goal: Study FRC formation at high density and injection/trapping in a liner-compatible geometry. Important test of FRC physics understanding and potential for MTF.
- Present design uses 12-cm diameter 30-cm long formation coil with quartz vacuum tube, 8-cm diameter aluminum metal liner. Structure is ~2 meters long.
- LANL and Air Force personnel are working together, aiming for first plasma/electrical system tests by Dec. 2000 at LANL.
- Two postdocs on board; three undergraduate students (MIT, CalTech, and Berkeley) will be involved this summer.



# MTF Revised Request

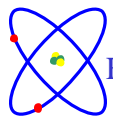
- Expanded theory program
- Analyze pulsed systems for energy application
- Resume research at AFRL on shaped liners needed for FRC injection.
- Faster progress on FRC formation physics
- Improved FRC formation technology
- More diagnostics





# TSTA Summary

- A complete initial plan for TSTA tritium removal has been developed
  - ◆ No showstoppers have been identified
  - ◆ Issues and uncertainties are being resolved with the appropriate stakeholders
  - ◆ Plan optimization is needed
- The baseline plan calls for an increase in TSTA funding to complete the work in a reasonable fashion
- LANL senior management is involved in the TSTA stabilization project
  - ◆ Concerned that nuclear facility be safely stabilized
  - ◆ Committed to performing the work efficiently



# Los Alamos Fusion Program Summary

- Emerging Concepts (the qualitatively different Innovative Confinement Concepts) have great potential for solving the complexity, first-wall, and cost-of-development issues for fusion.
- Guidance funding (\$2M) beyond FY2001 would not allow progress on cleanup of TSTA. Converting TSTA from Category 2 or 3 nuclear facility to a low-hazard radiological facility would save money in the long term. Additional funds for this purpose should be a program priority, especially if fusion receives the FY2001 Congressional increment being sought and discussed.

